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Tentative Title of the thesis

STUDIES ON THE NUTRITIVE STATUS OF FRESH WATER CRABS FROM YAVATMAL REGION, MAHARASHTRA

Research Proposal submitted.

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Submitted by

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Studies On Nutritive Status of Fresh Water Crabs from Yavatmal Region, Maharashtra

Introduction: -

Freshwater crabs play a vital ecological role in aquatic ecosystems and are often consumed as a source of protein by local communities. Understanding their nutritive status is essential for evaluate their potential as a food resource and for developing sustainable conservation and management strategies. Crabs are the basic components of the ecosystem, and they are swallow as food in many countries. Edible crustaceans such as crabs, prawns, shrimps, crayfishes be composed of major sources of nutritious food for humans. The nutritive value of crustaceans depends on their biological constituents such as proteins, carbohydrates, lipids, vitamins & minerals. Crabs have excellent and good taste as compared to fish & mollusks and rank third after shrimps and lobsters for their revered delicacy and value of fishery they support (Savad & Raghavan, 2001).

Marine derived peptides have been studied by researchers due to their numerous functional properties which can be applied in food industry and nutraceuticals (Kim *et al* 2010). The nutritive values of crustaceans depend upon their biochemical composition, such as protein, amino acids, lipid, fatty acids, carbohydrate, vitamins and minerals. Crab meat contains a lot of nutrients and is an attractive source of high-quality proteins, vitamins and minerals. It has been reported that many pomatids and parathelphusids are consumed in Thailand. Yeo *et al* (2008) reported that potamids are consumed by natives of South America to improve health and cure physical injuries. Many curative properties are attributed to crab meat because it is used to treat asthma and chronic fever (Raja, 1981). Being very cheap freshwater crabs represent a great food potential for human in India. There are 6, 700 species of crabs distributed all over the world, out of these 1,306 are freshwater crabs, 600 marine water crabs. Tropical regions have a maximum diversity of crabs in the world (Darren CJ *et al* 2008; Ling MT *et al* 2014). In India, about 389 different crab species were reported (Dev Roy *et al* 2007). True freshwater crabs are totally adopted for freshwater, semi-terrestrial or terrestrial appearances of life and could complete their life cycle in that region.

Freshwater crabs are a good source of food and medicinal value and are an important role in the food chain of aquatic ecosystems (Cobb BF *et al* 1975; Fang LS *et al* 1992). Tissues and hemolymph of mud crabs are also reported to possess antioxidant properties and many AMPS enable to inhibit the growth and kill many pathogenic organisms (Arulparkash *et al* 2017; Yusof W.R.W *et al*). The Yavatmal region is known for its rich biodiversity, including various species of freshwater crabs. However, there is a lack of comprehensive research on the nutritive status of these crabs in this region. This research proposal aims to investigate the nutritive status of freshwater crabs in the Yavatmal region, providing valuable insights into their nutritional value and potential as a local food source.

Purpose of work: -

There are 6, 700 species of crabs classified all over the world, of these 1,306 are freshwater crabs, 600 marine water and brackish water crabs. There are various species of crabs are being used as food all over the world because of their heigh nutrition content due to this study should done on crabs. Research on this topic should increase because the use of crab as a diet is increasing. Indians are up to high level depends on household treatment for various diseases. People use crab soup in the treatment of bone fractures, cough, cold, headache etc. so the nutritive status of crab should be researched more.

Review of literature: -

M.K Mukundan *et al* (1981) comparatively studied quality of the fish, crab and prawn they found crab is better than fish due to higher amounts of moisture, carbohydrate, iron, calcium and less fat. Many curative properties are attributed to crab meat because it is used to treat asthma and chronic fever (Raja, 1981). Lipids are highly efficient source of energy and offer more than double the energy released by carbohydrates and proteins. Generally, muscles of Crabs & prawns contain lesser quantity of lipid and freshwater crab meat is generally low in fat as compared to marine crabs (Bhavan 2009). Palmitic acid is the prime fatty acid at all evolutionary as well as tropic levels. In fish, the defense mechanism against microbial infections is performed particularly by palmitic acids through the pathogen-associated molecular pattern and T-cell signaling (Bergson, 2005). Zafar *et al* (2004) who found greater concentration of protein in female crab meat than their male counter parts. Difference in protein content between male and female fattening, and wild mud crabs could be attributed to environmental factors such as water salinity and temperature, as well as age and sex, season, place of collection, stage of maturity, and availability of food (Oliveria *et al* 2008; Kala and Chandran 2014). Yeo *et al* (2008) reported that potamids are consumed by natives of South America to improve health and cure physical injuries. Zafar *et al* (2004) who found greater concentration of protein in female crab meat than their male counter parts. Ozogul *et al* (2010) who have also reported variations in the protein contents of both male and female crab meat in Callinectes sapidus. Manhas *et al* (2013) studied water and lipid distribution pattern in female Paratelphusa masoniana (Henderson), an edible freshwater crab from Jammu region of J&K observed impact of mercuric chloride on lipid in the freshwater crab, Barytelphusa guerini, Das *et al* (2015) reported major lipid classes and their fatty acids in the flesh and hepatopancreas of an edible freshwater crab Varunal litterata (Fabricius 1798).

Freshwater crab meat is low in cholesterol when compared to marine and brackish water species. Varuna litterata can be judged as low-fat lean crab and hence recommended as perfect count as low fat protein to the patients suffering from gastrointestinal difficulties and overweight (Das *et al*, 2015; Dayal *et al.* (2019), who reported the highest amount of Ca (4817 mg/100g) detected in fattening crabs. The greater Ca content in male crabs is probably because this species has sexual dimorphism, in which males have larger claws and stiffer exoskeletons that are composed of calcium phosphate (Soundarapandian *et al*. 2013). In addition to maintaining healthy bones, magnesium acts in all soft tissue cells where it is part of the protein- making mechanism, and it is also needed for energy metabolism. Mg is a

cofactor for many enzyme systems (Soundarapandian *et al*, 2013). Sreelakshmi *et al*. (2016) who reported the fat) contents in male and female crabs to be 0.53% and 1.26%, respectively. According to Zafar *et al*. (2004), the fat content of S. serrata was 0.51 ±0.12%in males and 0.62 ± 0.13% in females.

Research gap: -

The research on this has not been done yet in the area which we have selected for our study. Crabs are used for their nutritive value so the work should be done on crab nutritive contents. Research on this topic should increase because the use of crab as a diet is increasing. Indians up to high level depends on household treatment for various diseases. People use crab soup in the treatment of bone fractures, cough, cold, headache etc. so the nutritive status of crab should be researched more.

Importance of study: -

1. **International status: -**There are 6, 700 species of crabs distributed all over the world, of these 1,306 are freshwater crabs, 600 marine water and brackish water crabs. There are various species of crabs that are being used as food all over the world because of their heigh nutrition content due to this study should done on crabs. Research on the topic has increased worldwide because of the use of crab in food in various countries and some under developing countries research on crab increased. The countries like China, Japan, USA, Bangladesh, increasing research in this field. The research paper which are available on topic are generally belongs to Bangladesh.

2. **National status: -** In India, about 389 different crab species were reported (Dev Roy *et al* 2007). As the large number of species of crabs are being found in India and the peoples of India use the crab soup for treatment of some diseases like cough, fever, headache, etc. to know whether the use of crab soup for cure of these diseases is good or bad for humans this study on crab is important.

3. **Regional status: -** the similar studies has not been conducted in Yavatmal region, so investigation is needed.
4. **Scope of study: -** To ensure the quality and safety of crab meat. To encourage sustainable harvesting and implement conservative strategies for freshwater crab.

Objectives of work: -

The primary objectives of this research project are as follows:

- Taxonomic studies of freshwater crabs of Yavatmal region barytelphusa cunicularis and Geothelphusa dehaani.
- To assess the proximate composition of muscle tissue of freshwater male and female crabs in the Yavatmal region, including moisture, protein, fat, ash, and carbohydrate content.

- To determine the mineral composition, including essential minerals (e.g., calcium, phosphorus, iron) in freshwater male and female crabs barytelphusa cunicularis and Geothelphusa dehaani.
- To analyze the fatty acid profile of crabs with a focus on omega-3 and omega-6 fatty acids.
- To evaluate the presence of any harmful contaminants, such as heavy metals, in male and female crabs.
- Contribution to the understanding of the nutritional value of barytelphusa cunicularis and Geothelphusa dehaani freshwater crabs as a potential food resource for local communities.
- Comparative study on nutritional quality of two different species of freshwater crabs of Yavatmal region.
- Data analysis for crabs' management policies and practices.

Hypothesis: --

This research project is expected to provide valuable information regarding the nutritive status of freshwater crabs in the Yavatmal region. Contribution to the understanding of the nutritional value of freshwater crabs as a potential food resource for local communities. Support for the development of sustainable harvesting and conservation strategies for freshwater crabs.

Research methodology: -

Sample collection: - Crabs will be collected from the rivers, ponds, and water streams near to tq: Pusad dist. Yavatmal (MS) India. As the crabs can survive for more than two days they are captured and transferred to the laboratory.

Systematic Studies of freshwater crab of Yavatmal Region

Scientific Classification	
Kingdom	Animalia
Phylum	Arthropoda
Subphylum	Crushtacea
Class	Malacostraca
Order	Decapoda
Infraorder	Brachyura
Family	Gecarcinucidae
Genus	Barytelphusa
Species	B.cunicularis

Scientific Classification	
Kingdom	Animalia
Phylum	Arthropoda
Subphylum	Crushtacea
Class	Malacostraca
Order	Decapoda
Superfamily	Potamoidea
Family	Potamidae
Genus	Geothelphusa
Species	G.deehani

Sample preparation and storage: -

The crab species were initially identified with the help of standard methods of identification like their body shape front and back legs. The identified species were preserved in ice. Carapace and meat will sample separately, and meats will store at -80℃. Fatty acid analysis will perform in triplicates consists of two consecutive steps: preparation of fatty acid methyl ester (FAME) and chromatographic analysis.

Laboratory Analysis:

- It consisted of analysis of moisture content, analysis of crude protein content using Micro-Kjeldahl method, analysis of crude fibre and analysis of oil using Soxhlet method.
- Oil Extraction Procedure from crab meat.
- Procedure of preparing fatty acid methyl esters.
- Gas chromatography procedure and fatty acid analysis.
- Analysis of water-soluble protein of crab meat.

Limitations of work: -

- Availability of crab could be a limitation.
- The parameters taken for study could be changed as per the species.
- Changes in results could be due to the changes in natural factors like temp and pH of water bodies from where samples will be collected.

Expected outcomes: -

This research project is expected to provide valuable information regarding the nutritive status of freshwater male and female crabs in the Yavatmal region. Contribution to the understanding of the nutritional value of freshwater crabs as a potential food resource for local communities. Support for the development of sustainable harvesting and conservation strategies for freshwater crabs.

Year wise work plan: -

First year:

- Extensive collection of reviews of literature of given topic.
- Collection of data of given research topic.
- Sample collection field visit.
- Data collection.

Second year:

- Field visit/survey.
- identification of nutritive value of crabs.
- Preparation of research paper.
- Collection of required instruments.

Third year:

- Statistical data analysis.
- Preparation of tables, graphs, figures, calculations.
- Paper publication typing work.
- Preparation of final synopsis.
- Reference collection.

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